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XRP as Universal Bridge

This document describes the forces that could lead to XRP becoming a universal bridge currency. It also documents the forces that work against XRP as a bridge. It presents things Ripple Labs can do to encourage XRP bridging and why we should do so.

Liquidity

XRP is a purely virtual currency. As such, XRP's value is tied directly to its liquidity. Meaning at any given moment your XRP position is worth exactly what someone else is offering to give you for it. No buyers means no value. Conversely, your XRP becomes more valuable as its liquidity increases. (i.e. instantaneous demand)

XRP's absolute maximum liquidity arises when the cheapest conversion path between every other pair of currencies trades through XRP as a bridge currency. This is fairly easy to prove, but less easy to achieve.

XRP as a Bridge Currency

Direct and bridged payment transactions can be compared as follows:

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Path Type                Path Cost
_______________        _________________________________
Direct Path              X USD *       EUR/USD       = Z EUR
XRP Bridge Path          Y USD * XRP/USD * EUR/XRP = Z EUR
                  where  Y < X
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Because pathfinding's job is to find the lowest cost, XRP will only serve as a bridge when Y is less than X. That means the sum of the XRP/USD and EUR/XRP component costs must be less than the direct EUR/USD cost. If that holds in both directions, then XRP's spread cost against both USD and EUR must average less than half of the direct spread between the two.

Universal Bridge Currency

If we position XRP as a universal bridge currency then by definition the "half spread" relationship must hold against every currency. As a universal bridge, XRP guarantees you (as XRP holder) the following liquidity benefits:

1. Someone paying you in XRP incurs half the conversion cost when making a cross currency payment.
2. You incur half the conversion cost when making cross currency payments to others.
3. You get the best "market" price when sending payments.
4. If you want a better than market price, your "limit" orders go into the highest velocity market.

Value #1: Liquidity benefits alone may entice end-users to purchase (store value in) XRP.

However, it is useful to note that each XRP bridge transaction is intrinsically neutral toward XRP demand. The best way to visualize this is to think of paths where the same trader has the best

price on both ends of the bridge. In this situation, the trader ends up buying XRP from himself. His net liquid XRP at the end of the transaction is exactly the same as at the beginning of the transaction. The same is true with two market makers. The same amount of XRP stays liquid. It just made available by a different trader.

XRP Bridging Supports XRP Price

Nonetheless it is possible to show that, when XRP is acting as a universal bridge, XRP's market price becomes tied to the total cross currency conversion volume of the Ripple network. Increases in volume directly support increases in XRP price. The logic is as follows:

1. An increase in conversion volume necessitates an increase in XRP trading velocity.
2. The increase in velocity, increases every trader's return rate on the same working capital.
3. Increased profit drives competition from new players who must purchase an XRP trading stake.
4. Additional XRP demand against a fixed market based supply increases XRP's relative price.
5. The new competition re-closes the market spread around the higher price.

Value #2: Demand for XRP as a medium-of-exchange augments but is completely independent of the demand for holding XRP as a store-of-value. This use case brings an independent baseline for XRP value even absent consumer demand.

Hurdles to XRP as a Universal Bridge Currency

Unfortunately, while it is possible for XRP to become a universal bridge currency, it absolutely CAN NOT happen without Ripple Lab's assistance. The key reasons are:

1. Market makers require more working capital to provide the same amount of liquidity.
2. XRP volatility adds additional market making risk

Those factors naturally increase XRP bridged spreads over their direct equivalents. Thus disabling the bridge itself. Adding to the odds,

3. It's much more likely that USD becomes established as the bridge currency long before XRP does.

Outside Ripple, USD and the five other majors act as bridge currencies to the exotics. Inside Ripple, USD actually makes a more natural bridge currency than XRP. USD tends to be more liquid and less volatile than XRP.

Self Imposed Hurdles

Worse yet, our FI partners are hesitant to even consider XRP. The friction is so high that business development avoids discussing XRP at all. Without the FI's volume there is little reason for traders to make tight XRP markets. Absent tight markets XRP has no ability to bridge.

Continuity: XRP bridging gives RL a concrete pitch for continuing to wholesale XRP. It also fits into our BD messaging even if we choose never to promote consumer use of XRP.

Required enablers for an XRP Universal Bridge Currency

Fortunately, while existing markets are small, RL has the ability to overcome these hurdles.

1. Market maker XRP subsidies can reduce the additional working capital requirement.
2. Ripple Labs can underwrite the volatility risk to narrow XRP bridge spreads.
3. Over the longer term additional XRP capital costs will be more than offset by bridging's benefits:
    a. More balanced trading flows
    b. Additional market volume

Timing

Ripple pathfinding always works to reinforce the lowest costs paths. As such, establishing XRP as bridge early becomes self reinforcing. However, that same natural reenforcement applies to any established bridge currency including USD. So unseating USD a bridge will be much harder than establishing XRP early.

Note that if USD becomes Ripple's de facto bridge currency, XRP loses the additional medium-of-exchange value described above. It will still be valued by those looking for the best cryptocurrency asset in which to store value. But as these types of value are cumulative, XRP's total value will always be lower when not used as a bridge.

The Dirty Details

Working Capital

Suppose Mark wants to provide a million dollars worth of liquidity in both directions between USD and EUR. Then Mark will need two million dollars worth of working capital. One million dollars worth of dollars to offer for euros. Another million dollars worth of euros with which to bid on dollars.

If Mark wants do the same trading through XRP, he will need to hold a third million dollars worth of XRP as well. This represents a 50% increase in the working capital requirements.

This is not linear of course. If Mark is already holding ten currencies then the adding XRP amounts to 10%. But, for any given conversation volume between EUR and USD, Mark's XRP bridge path trades will always be both lower profit per conversion (user's cost == Mark's profit) and require more working capital.

Remedy: Subsidize important market maker's initial XRP trading stake.

Bring more FI partner conversion volume through the XRP bridge.

Volatility

In addition, because Mark now holds three standing positions, he is exposed to additional XRP currency risk.

EUR/USD and EUR/XRP/USD both have the same EUR/USD currency risk. As such, I'll ignore the common risk to concentrate on the additional XRP risk. So given the above scenario, let's presume that EUR/USD maintains the same ratio, while XRP varies against both.

Given that Mark wants to maintain a million dollars worth of each currency and withdraw his profits as he goes. If flows were balanced from EUR->USD and USD->EUR then in a direct market with static rates, Mark would have to do nothing but withdraw the excess balances from his accounts each day.

But even given balance flows and static EUR/USD rates, bridging through XRP adds volatility risk. Mark benefits on days when XRP's value moves up against EUR/USD. Because the previous day's XRP are worth more than a million dollars, Mark can cash out the excess in addition to his trading profits. However, XRP moves down can eat into the trading profits or even require Mark to deposit additional funds in order to purchase supplemental XRP.

Remedy: Underwrite important market maker's exposure to XRP price volatility

Underwriting

While the market is still small and new, it may be in Ripple Lab's favor to underwrite our important market making partners against large downward movements in the price of XRP. The goal is to give market makers the risk comfort to narrow spreads far enough for XRP to act as a bridge.

Notice that the underwriting cost should be minimal. Underwriting is costless while the value of XRP is increasing. As discussed above, once XRP is established as a universal bridge currency, maintaining it as such binds the value of XRP to the total currency conversion volume through the system. If trading through Ripple continues to increase then the cost of underwriting XRP declines is effectively zero.

Sustaining XRP as a Bridge Currency

There will always be force working against XRP as a "universal" bridge. Acting as a bridge requires XRP markets to have the narrowest spread. However, even when that is the case, there are still ways to create cheaper paths than the XRP bridge. The most common "cheapest" case is bilateral net settlement. If two parties decide to net settle their bi-directional flows, then the balanced transaction volume comes at zero cost. The smaller unbalanced amount can then be gross settled through the XRP bridge at the best market rate.

The key to keeping XRP valuable as a bridge currency is to assure there is sufficient positive value to overcome the bridge currency's additional overhead.

Bridge Currency Velocity

Direct markets require you to hold working capital in both currencies in order to make one (whole fee) market. Making two XRP markets instead gives you (half fee) access between two currencies and every other currency. Bridging adds additional cost free benefits as the number of currencies and/or counter-parties being bridged increases.

Balanced Flows

Where there are unbalanced flows, someone has to bare the external overhead of rebalancing the flows. This is normally accomplished by traders withdrawing the less demanded funds from Ripple, trading them for funds in demand funds through another market, redepositing these funds into Ripple, than marking up those costs in their Ripple marketplace orders. Trading through XRP has the effect of consolidating the total number of markets therefore increasing depth and balance.